Project Delivery Network

Roadway Design QC Checklist

Version
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Introduction

The Project Delivery Network Roadway QC Checklist is to be used with the UDOT QC/QA Procedure. This checklist is a tool to assist the project team in verifying all work is produced with due diligence, using acceptable industry standard techniques, available resources and data, and reasonable decisions by competent professionals. The checklist is a tool for the delivery of quality documents and cannot replace the sound judgment and experience of competent professionals. It is the Design Team's responsibility to verify the quality of project documents **before** distribution.

Checklist Instructions

For each deliverable listed, the QC Checker is to verify all items listed in the checklist are complete, along with any additional items the QC Checker deems necessary. The checklist items are not to be interpreted as the only items that need to be verified.

Once all items are verified, the QC Checker is to sign the associated cover sheet and upload it onto ProjectWise. The QC is not complete until the cover sheet is signed, dated, and uploaded onto ProjectWise. See the Project Delivery Network QC/QA Procedure for the appropriate cover sheet.

QC reviews are to be completed **before** distribution.

The following explanations are to aid in completing the QC checklist items:

- A checklist item deemed "complete", "correct", or "accurate" does not denote that the item is perfect, but rather that the item satisfies design criteria based on known information, acceptable techniques, and sound judgment."
- A checklist item deemed "addressed" denotes the item as "reviewed all known concerns and verified the concerns are appropriately mitigated and satisfy design criteria." Addressed concerns are not necessarily incorporated into the design, but satisfactorily mitigated.
- A checklist item deemed "identified" denotes the item as "an acceptable and economical approach to satisfy design criteria based on known information."
- A checklist item deemed "verified" denotes the item as "verified the approach/conclusion as acceptable based on known information."
- Use the check boxes to verify the checklist items are complete. If a checklist item is *not applicable* to the current project, place an NA over the check box to denote the item as not applicable. This will allow the quality assurance to verify all items were addressed.
- Use the comment sections of the Cover Sheets to address exceptions, assumptions, and unique aspects of the project. The comments will help others understand why certain decisions were made and their impacts on the project.

Roadway Checklist Instructions

Verify with the Project Manager the level of effort for each milestone review. If necessary, revise the QC checklist items to correspond with the expected level of effort.

1R1 Develop Roadway Scope

Determine the preliminary project footprint.

References

1. AASHTO, A Policy on Geometric Design of Highways and Streets
2. UDOT Roadway Design Manual of Instruction
3. 13 Critical Elements
4. UDOT Additional Design Criteria
5. Project Development Business System
6. UDOT Project Delivery Network
7. UDOT QC/QA Procedures
8. UDOT Practical Design Guide
9. Estimate Review Checklist

Preliminary Footprint Review Drawing

1. ☐ A field visit was conducted.
2. ☐ Roadway related deficiencies were developed and reviewed.
    a. ☐ Obtained capacity and safety deficiencies from project traffic engineer
    b. ☐ Reviewed multi-modal needs
3. ☐ Roadway related deficiencies were considered and addressed.
    a. ☐ Capacity deficiencies
    b. ☐ Safety needs
    c. ☐ Multi-modal needs
    d. ☐ For deficiencies not addressed, adequate justification is provided
4. ☐ Preliminary typical sections developed to determine roadway footprint.
    a. ☐ Each typical section conforms to the PDC.
    b. ☐ Each typical section correctly shows the existing and proposed roadway width.
5. ☐ The preliminary cut/fill lines approximations are appropriate for the level of effort and available information.
6. ☐ Coordination with the following disciplines occurred and their preliminary designs incorporated into the preliminary footprint:
    a. ☐ Environmental
    b. ☐ Right of Way
    c. ☐ Hydraulics
    d. ☐ Structures
    e. ☐ Utilities

1R1 Continued

f. ☐ Traffic and Safety

7. ☐ If preliminary horizontal and vertical alignments were developed, they meet design standards (see 2R1 for checklist items).
8. ☐ All computer program input is entered correctly (InRoads, Excel spreadsheets, etc).
9. ☐ All calculations are correct.
10. ☐ The Preliminary Footprint Review Drawing is ready for distribution and review.
    a. ☐ Known existing topography is shown in the correct grayscale.
    b. ☐ Known ROW is shown (existing and proposed).
    c. ☐ If developed, preliminary horizontal and vertical alignments are included.
        i. ☐ Each alignment named correctly
        ii. ☐ Coordinates for POB, POE, and crossings with other alignments labeled correctly
        iii. ☐ Bearings of tangents labeled correctly
        iv. ☐ Curve information is labeled correctly.
    d. ☐ All information appropriate for review of the proposed footprint is included and correct.
    e. ☐ Drawings are prepared in the format(s) approved by the Project Manager and reviewers.

Preliminary Roadway Cost Estimate

1. ☐ The preliminary roadway cost estimate was reviewed using the Estimate Review Checklist (found at the end of this document).

2R1 Model Initial Roadway Design

Determine the recommended horizontal and vertical alignments by developing the initial roadway model.

References

1. AASHTO, A Policy on Geometric Design of Highways and Streets
2. UDOT Roadway Design Manual of Instruction
3. AASHTO Roadside Design Guide
4. 13 Critical Elements
5. UDOT Additional Design Criteria
6. UDOT CADD Standards
7. UDOT Standard and Supplemental Drawings
8. Design Exception, Design Waivers, and Deviation from Standards Forms
9. Project Development Business System
10. UDOT Project Delivery Network
11. UDOT QC/QA Procedures
12. UDOT Practical Design Guide
13. Estimate Review Checklist

Recommended Alignments Review Drawing

1. ☐ All review comments are addressed and the comment resolutions sent to the design leader.
2. ☐ All revisions based on comments are complete.
3. ☐ Horizontal alignments meet design standards.
    a. ☐ 13 Critical Elements (4)
    b. ☐ Additional Design Criteria (5)
    c. ☐ AASHTO chapter 3 (1)
    d. ☐ Minimum radius requirements (1)
    e. ☐ Roadway Design Manual of Instruction Section 7 (2)
    f. ☐ Stationing goes from south to north or west to east and reads left to right.
    g. ☐ For an alignment that follows an existing alignment, the new alignment is based off ROW markers or common tie points between the existing alignment and the proposed alignment.
4. ☐ Vertical alignments meet design standards.
    a. ☐ Roadway Design Manual of Instruction Section 7 (2)
    b. ☐ K>Kmin (1)
    c. ☐ Minimum length of vertical curve (L min = 3V) (1)
    d. ☐ Checked for hydraulic requirements (1)
    e. ☐ Min. slope = 0.3%, 0.5% preferred
    f. ☐ Ksag < 167

2R1 Continued

g. ☐ Consulted with Region Hydraulics Engineer about potential drainage issues

5. ☐ Superelevations meet design standards or design exception.
   a. ☐ Does not exceed UDOT approved maximum superelevation (2, 1)
   b. ☐ Follows transition rates in AASHTO (1)
   c. ☐ Transitions for change in cross slope in order to tie into cross streets follow superelevation transition rates
   d. ☐ All reverse superelevations are identified.
6. ☐ Horizontal and vertical alignments were coordinated with the structures team.
7. ☐ The initial roadway model contains all necessary information to analyze the proposed design.
8. ☐ The model templates represent all aspects of the proposed roadway.
   a. ☐ Number of lanes and width
   b. ☐ Superelevations
   c. ☐ Turn bays (based on assumed lengths)
   d. ☐ Shoulders and bike lanes
   e. ☐ Curb and gutter
   f. ☐ Sidewalks and park strips
   g. ☐ Sideslope treatments
      i. ☐ Clear zones
      ii. ☐ Retaining walls
9. ☐ The proposed design surface represents the proposed design.
10. ☐ All cut/fill lines are within existing or proposed ROW.
11. ☐ All impacts due to cut/fill lines are addressed.
12. ☐ Correct clear zone used for the design speed and ADT.
13. ☐ The roadway design complies with the PDC.
14. ☐ Potential utility conflicts are identified and coordinated with the Region Utility and Railroad Coordinator.
15. ☐ Surface drainage was coordinated with the drainage engineer.
16. ☐ All flat spots are identified.
17. ☐ The Roadway Review Drawing is ready for distribution and review
    a. ☐ Existing topography is in proper grayscale.
    b. ☐ Existing features are labeled as needed.
    c. ☐ All street names are included and correct.

2R1 Continued

d. ☐ North arrow and scale is included and correct.

e. ☐ Preliminary cut/full lines are shown.

f. ☐ Existing and proposed ROW is shown.

g. ☐ Proposed horizontal and vertical alignments are included and annotated correctly.

i. ☐ Each alignment named correctly

ii. ☐ Coordinates for POB, POE, and crossings with other alignments labeled correctly

iii. ☐ Bearings of tangents labeled correctly

iv. ☐ Curve information is labeled correctly

h. ☐ For vertical alignments the following are correctly shown.

i. ☐ Existing ground

ii. ☐ Profile grid elevations

iii. ☐ Intersected streets, railroads, grade-separated structures, culverts, streams, etc.

i. ☐ Labels are included and correct for all design features needing identification.

j. ☐ Striping was considered if needed to show lane widths .

k. ☐ All necessary information for a proper review of the initial roadway design is included.

18. ☐ All computer program input is entered correctly.

19. ☐ All calculations are correct.

Design Exceptions, Design Waivers, and Deviation from Standards Forms

1. ☐ Design exception and design waiver form is complete for any design element that does not meet the 13 critical elements or additional design criteria.
2. ☐ Deviation from standards form is complete for any design element not conforming to UDOT standards.
3. ☐ Cost estimates justifying exception(s), waiver(s), and/or deviation(s) from standards are appropriate.

Roadway Cost Estimate

1. ☐ The roadway cost estimate was verified using the Estimate Review Checklist (found at the end of this document).

3R1 Complete Roadway Design

This activity will result in a completed design for the project. Based on decisions from 2V1, refine the roadway model to include items like guardrail slope flattening, curb returns, and widening for overhead sign locations. Modify the design as necessary to include other discipline needs like drainage facilities, utilities, signal, signs, and ATMS.

References

1. (AASHTO, A Policy on Geometric Design of Highways and Streets
2. Roadway Design Manual of Instruction
3. AASHTO Roadside Design Guide
4. 13 Critical Elements
5. UDOT Additional Design Criteria
6. UDOT CADD Standards
7. UDOT Plan Sheet Development Standards
8. UDOT Standard and Supplemental Drawings
9. Design Exception, Design Waivers, and Deviation from Standards Forms
10. Project Development Business System
11. UDOT Project Delivery Network
12. UDOT QC/QA Procedures
13. UDOT Practical Design Guide
14. Estimate Review Checklist

Preliminary Roadway Plan and Profile Sheets

1. ☐ All review comments are addressed and the comment resolutions sent to the Design Leader.
2. ☐ All revisions based on comments are complete.
3. ☐ All revisions to alignments conform to design standards (use applicable items from 2R1 checklist).
4. ☐ Templates for each unique section of the design are complete.
5. ☐ For each template, the following are correct:
    a. ☐ Number of lanes and width
    b. ☐ Superelevations
    c. ☐ Turn bays (based on assumed lengths)
    d. ☐ Shoulders and bike lanes
    e. ☐ Curb and gutter
    f. ☐ Sidewalks and park strips
    g. ☐ Sideslope treatments
        i. ☐ Clear zones
        ii. ☐ Retaining walls
    h. ☐ Pavement section
    i. ☐ Transitions

3R1 Continued

i. ☐ Gore areas

ii. ☐ Lane widening

6. ☐ Roadway model is complete
   a. ☐ Grading is complete and considers the following
      i. ☐ Accommodations for guardrails and barriers
      ii. ☐ Driveways and approaches
      iii. ☐ Curb returns
      iv. ☐ Cross streets
      v. ☐ Accommodations for drainage
      vi. ☐ Overhead sign locations
      vii. ☐ Retaining walls
      viii. ☐ Major and minor structures
   b. ☐ All design surfaces are created
   c. ☐ All cut/fill lines are within the ROW
   d. ☐ All additional ROW, utility, and other impacts are identified
7. ☐ All driveway connections meet UDOT requirements. (8, 2)
8. ☐ Adequate sight distance and traffic signal sight distance is provided.
9. ☐ Adequate sight distance is provided at all critical locations. (2, 1)
10. ☐ Adequate protection is provided for all clear zone hazards. (2)
11. ☐ Length of need (LON) conforms to UDOT standards. (2)
12. ☐ Proposed end treatments meet UDOT requirements. (2, 1)
13. ☐ All pedestrian facilities meet UDOT and ADA requirements.
14. ☐ Adequate pavement width is provided based on the turning radius of the design vehicle.
15. ☐ Curb and gutter, sidewalk, park strip, and median locations, types, and widths meet the requirements of the project and conform to UDOT standards.
16. ☐ All curb return radii conform to UDOT standards. (2)
17. ☐ All side treatments meet UDOT standards. (3)
18. ☐ All cross street tie-ins conform to UDOT standards. (2)
19. ☐ All roadway environmental commitments are addressed.
20. ☐ All items in the OSR are addressed.
21. ☐ The roadway design conforms to UDOT CADD Standards. (6)

3R1 Continued

22. ☐ The roadway design conforms to UDOT Standard and Supplemental Drawings and/or necessary approval for non-standard design elements was obtained. (8)
23. ☐ The design fulfills the goals of the project scope.
24. ☐ The roadway design includes all necessary elements to construct the project.
25. ☐ All preliminary plan sheets conform to UDOT Plan Sheet Development Standards. (7)
    a. ☐ All sheets are cut appropriately.
    b. ☐ All reference files are properly attached.
    c. ☐ Plan sheet CADD standards are followed and maintained on each sheet.
26. ☐ Roadway Plan Sheets are complete. (See (7) – Roadway Plan Sheet Requirements)**
    a. ☐ The items from the "RD Sheet Checklist" which are necessary for a Plan-in-Hand Review are complete and correct. (7)
27. ☐ Roadway Profile Sheets are complete. (See (7) – Roadway Profile Sheet Requirements)**
    a. ☐ The "RP Sheet Checklist (Profile)" items are complete. (7)
    b. ☐ The "RP Sheet Checklist (Superelevation)" items are complete. (7)
    c. ☐ The profile grid is labeled correctly on each sheet.
28. ☐ (If required) The cross sections are complete.
    a. ☐ The correct proposed pavement section is used.
    b. ☐ All proposed roadway features are correctly shown.
    c. ☐ Cut/fill areas, side slopes, and retaining walls are shown correctly.
    d. ☐ All labels, callouts, and dimensions are correct.

Preliminary Typical Section Plan Sheets

1. ☐ Typical sections are complete. (See (7) - Typical Sections)
    a. ☐ The number of typical sections is consistent with PSDS guidelines.
    b. ☐ Each typical section correctly shows the proposed roadway width (included existing roadway for any portion of existing roadway not reconstructed).
        i. ☐ Lane and shoulder widths are correct.
        ii. ☐ All side slope treatments are displayed and labeled correctly.
        iii. ☐ Curb & gutter, park strip, and sidewalk are displayed and labeled correctly.
    c. ☐ Proposed and existing pavement thickness is shown and labeled correctly (based on available information).
    d. ☐ The typical sections match the design model exactly.
    e. ☐ Station limits are correct.

3R1 Continued

2. ☐ Typical Section Plan Sheets are complete. (See (7) –Typical Section)**
    a. ☐ The "TS Checklist" items are complete. (7)
    b. ☐ If a table is used to reduce number of typical sections, the begin and end station and offsets for each roadway feature are correctly identified.
    c. ☐ Reference file guidelines are followed.

Design Exceptions, Design Waivers, and Deviation from Standards Forms

1. ☐ Design exception and design waiver form is complete for any design element that does not meet the 13 critical elements or additional design criteria.
2. ☐ Deviation from standards form is complete for any design element not conforming to UDOT standards.
3. ☐ Cost estimates justifying exception(s), waiver(s), and/or deviation(s) from standards are appropriate.

Roadway Cost Estimate

1. ☐ The Roadway cost estimate was verified using the Estimate Review Checklist (found at the end of this document).

**Verify with the Project Manager the level of effort expected for this review submittal.

3R2 Complete Signing and Striping Design

Using the roadway model as a guide, develop the signing and striping design for the project. Locate appropriate sites for placement of overhead sign structures (if applicable). Develop MOT design. Develop preliminary signing, striping, and MOT plan sheets.

References

1. (MUTCD) Manual on Uniform Traffic Control Devices
2. UDOT Sign Manual
3. Structures Design and Detailing Manual
4. Roadway Design Manual of Instruction
5. AASHTO Roadside Design Guide
6. UDOT CADD Standards
7. UDOT Plan Sheet Development Standards
8. UDOT Standard and Supplemental Drawings
9. Project Development Business System
10. UDOT Project Delivery Network
11. UDOT QC/QA Procedures
12. UDOT Practical Design Guide
13. Estimate Review Checklist

Preliminary Signing and Striping Plan Sheets

1. ☐ All review comments are addressed and the comment resolutions sent to the design leader.
2. ☐ All revisions based on review comments are complete.
3. ☐ All signing and striping conforms to the latest UDOT accepted version of the MUTCD.
4. ☐ The signing design is complete.
    a. ☐ All guide signs have been designed using approved computer software.
    b. ☐ Sign installation is appropriate for each sign.
    c. ☐ The design conforms to *UDOT Standard and Supplemental Drawings* and/or necessary approval for non-standard design elements was obtained.
    d. ☐ All signs to be replaced, modified, or upgraded are in accordance with the project scope.
    e. ☐ Signs required for the project, but located outside the project limits, were considered.
5. ☐ The Striping design is complete.
    a. ☐ Lane widths, tapers, and transitions meet UDOT standards and approved PDC.
    b. ☐ The signing and striping addresses findings in the capacity analysis.
    c. ☐ All striping types and sizes are correct.
    d. ☐ Crosswalks are located where warranted.
6. ☐ All additional ROW needs for signs are included in the ROW design.
7. ☐ The designs conform to UDOT CADD Standards (6).

3R2 Continued

8. ☐ Signing and Striping Plan Sheets conform to UDOT plan sheet development standards. (7)**
    a. ☐ All sheets are cut appropriately.
    b. ☐ All reference files are properly attached.
    c. ☐ Plan sheet CADD standards are followed and maintained on each sheet.
    d. ☐ CADD standards are maintained on each sheet (i.e. lines styles shown correctly, cell scaling, etc.).
    e. ☐ Label pavement marking type.
    f. ☐ Call out proposed sign locations.
    g. ☐ Additional callouts, notes, identifiers, symbols, and information required for the plan-in-hand review are provided and correct.

Overhead Sign Locations

1. ☐ All proposed overhead signs meet the condition requirements listed in the *UDOT Sign Manual*.
2. ☐ All signs conform to the latest UDOT accepted version of the MUTCD.
3. ☐ All overhead sign structures were coordinated with the structures group.
4. ☐ All foundation locations are within the existing or proposed ROW.
5. ☐ All poles are outside of the clear zone or properly protected. (8)
6. ☐ All utility conflicts are identified and coordinated with the utility team.
7. ☐ The design locations meet the minimum sight distance requirements. (2)
8. ☐ Locations are far enough from decision points to allow corrections to be safely maneuvered.
9. ☐ Locations have been coordinated with ITS to maximize use of facilities.
10. ☐ Power source locations are identified and coordinated with the power company.
11. ☐ Exit direction signs are located near the theoretical gore. (2)
12. ☐ The design conforms to UDOT CADD Standards. (6)
13. ☐ The design conforms to UDOT Standard and Supplemental Drawings and/or necessary approval for non-standard design elements was obtained. (8)
14. ☐ The design fulfills the needs and requirements of the project.

Preliminary Maintenance-of-Traffic Plan Sheets

1. ☐ All potential alternative routes were evaluated.
2. ☐ An alternate route was designated to advise motorists of impacts and allow them to avoid project limits if desired.

3R2 Continued

3. ☐ Signs indicating business access is being maintained are located to clearly inform motorist and allow adequate decision time.
4. ☐ All non-state highway use was coordinated with the appropriate local agency.
5. ☐ If available, permanent overhead VMS and HAR radio sites were considered for use during the project.
6. ☐ All mandated road closures were considered and the design shows how to detour traffic around each anticipated closure (If applicable).
7. ☐ MOT Plan Sheets conform to UDOT plan sheet development standards. (7)**
    a. ☐ All sheets were cut appropriately.
    b. ☐ All reference files are properly attached.
    c. ☐ Plan Sheet CADD standards were followed and maintained on each sheet.
    d. ☐ All callouts, notes, identifiers, symbols, and information required for the Plan-in-Hand Review is provided and correct.

Signing, Striping, and MOT Cost Estimate

1. ☐ The cost estimate was verified using the Estimate Review Checklist (found at the end of this document).

**Verify with the Project Manager the level of effort expected for this review submittal.

3R3 Complete Signal and Lighting Layout Designs

Complete the signal layout design according to the *UDOT Design of Signalized Intersections Manual*. Create preliminary signal plan sheets. Develop the lighting design according to the *AASHTO Roadway Lighting Design Guide*. Create preliminary plan sheets.

References

1. UDOT Design of Signalized Intersections Manual
2. AASHTO Roadway Lighting Design Guide
3. Roadway Design Manual of Instruction
4. AASHTO Roadside Design Guide
5. UDOT CADD Standards
6. UDOT Plan Sheet Development Standards
7. UDOT Standard and Supplemental Drawings
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Preliminary Signal Plan Sheets

1. ☐ Signal poles are located as close to the center back of the corner or pedestrian ramp as possible. (1)
2. ☐ Push button locations comply with UDOT requirements. (1)
3. ☐ All overhead clearances comply with UDOT requirements. (1)
4. ☐ Signal head types and placement comply with UDOT requirements. (1)
5. ☐ Vehicle detection was coordinated with the Traffic Management Division (TOC).
6. ☐ Circuit design is in compliance with UDOT requirements. (1)
    a. ☐ The power source location is identified and coordinated with the power company.
    b. ☐ All signal heads are identified and located appropriately.
    c. ☐ The required lighting is identified and coordinated with the lighting design.
    d. ☐ Detection types and locations are identified.
    e. ☐ Interconnect is identified and located appropriately.
    f. ☐ All conduits are identified and located appropriately.
    g. ☐ All junction boxes are identified and located appropriately.
    h. ☐ Ground rods and wires are identified and located appropriately.
    i. ☐ Controller cabinets are identified and located appropriately.
7. ☐ The design conforms to UDOT CADD Standards. (5)
8. ☐ The design conforms to UDOT Standard and Supplemental Drawings. (7)

3R3 Continued

9. ☐ The design fulfills the needs and requirements of the project.
10. ☐ Signal Plan Sheets conform to UDOT plan sheet development standards. (6)**
    a. ☐ All sheets were cut appropriately.
    b. ☐ All reference files are properly attached.
    c. ☐ Plan Sheet CADD standards are followed and maintained on each sheet.
    d. ☐ All callouts, notes, identifiers, symbols, and information required for the Plan-in-Hand Review is provided and correct.

Preliminary Lighting Plan Sheets

1. ☐ Lighting design includes betterment requests from local jurisdictions.
2. ☐ Luminaire spacing was computed correctly and verified using approved software. (2)
3. ☐ All necessary design elements (conduit, circuit schematics, connections, etc.) to complete the design are included.
4. ☐ Power source needs are identified and coordinated with the power company.
5. ☐ All ROW needs have been identified and communicated to the ROW design team.
6. ☐ The design conforms to UDOT CADD Standards. (5)
7. ☐ The design conforms to UDOT Standard and Supplemental Drawings and/or necessary approval for non-standard design elements was obtained. (7)
8. ☐ The design fulfills the needs and requirements of the project.
9. ☐ Lighting Plan Sheets conform to UDOT plan sheet development standards. (6)**
    a. ☐ All sheets were cut appropriately.
    b. ☐ All reference files are properly attached.
    c. ☐ Plan Sheet CADD standards are followed and maintained on each sheet.
    d. ☐ All callouts, notes, identifiers, symbols, and information required for the Plan-in-Hand Review is provided and correct.

Cooperative Agreement

1. ☐ All descriptions, project identifiers, headers, and footers are correct.
2. ☐ The agreements correctly describe the work to be done.
3. ☐ Responsible parties are correctly assigned all work.
4. ☐ All cost estimates are appropriate.

Request for ROW

1. ☐ All requests for additional ROW have been coordinated with the ROW department.

Signal Cost Estimate

1. ☐ The cost estimate was verified using the Estimate Review Checklist (found at the end of this document).

Lighting Cost Estimate

1. ☐ The cost estimate was verified using the Estimate Review Checklist (found at the end of this document).

**Verify with the Project Manager the level of effort expected for this review submittal

4R1 Complete Roadway Plans & Documents

Following *UDOT Plan Sheet Development Standards*, finalize the roadway plan and profile sheets and create roadway plan summaries, details, and additional plan sheets. Prepare and assemble roadway project documents. Finalize roadway cost estimate.

References

1. AASHTO, A Policy on Geometric Design of Highways and Streets
2. Roadway Design Manual of Instruction
3. AASHTO Roadside Design Guide
4. UDOT CADD Standards
5. UDOT Plan Sheet Development Standards
6. UDOT Standard and Supplemental Drawings
7. UDOT Standard and Supplemental Specifications
8. Specification Writer's Guide
9. Measurement and Payment Template
10. Acceptance and Documentation Guide
11. Project Development Business System
12. UDOT Project Delivery Network
13. UDOT QC/QA Procedures
14. UDOT Practical Design Guide
15. Estimate Review Checklist

Roadway Plan and Profile Sheets

1. ☐ All review comments are addressed and the comment resolutions sent to the Design Leader.
2. ☐ All revisions based on comments are complete.
3. ☐ All roadway design revisions conform to design standards (verify using appropriate checklist items from 3R1).
4. ☐ The design conforms to UDOT CADD Standards (4).
5. ☐ The design conforms to UDOT Standard and Supplemental Drawings and necessary approval for non-standard design elements was obtained (6).
6. ☐ All **Plan Sheets** conform to UDOT Plan Sheet Development Standards (5).
    a. ☐ Call-out rules are followed.
    b. ☐ All title blocks are filled out correctly.
    c. ☐ Plan Sheet CADD standards are followed and maintained on each sheet.
7. ☐ **Typical Sections** are complete (See (5) – Typical Sections).
    a. ☐ All revisions and new typical sections meet design standards (see 3R1 checklist).
    b. ☐ The *PSDS Typical Sections* checklist items are complete.
    c. ☐ All necessary labels, callouts, identifiers, symbols, and notes are provided and correct.

4R1 Continued

8. ☐ **Detail Sheets** are complete (See (5) – Detail Sheet Requirements).
    a. ☐ The *PSDS DT Sheet Checklist* items are complete.
    b. ☐ All details are labeled and dimensioned completely and correctly (5).
    c. ☐ All necessary labels, callouts, identifiers, symbols, and notes are provided and correct.
9. ☐ The **Summary Sheets** are complete (See (5) – Summary Sheet Requirements).
    a. ☐ The *PSDS Summary Sheet Requirements* are followed and complete.
    b. ☐ UDOT standard summary sheets are used.
    c. ☐ All pay items are included in the summary.
    d. ☐ All quantities are calculated correctly.
    e. ☐ All pay item names, alignment designations, stations, offsets, units, and quantities are correct.
    f. ☐ All summaries are exported from Excel to Microstation and the sheets are updated with the current Excel version.
    g. ☐ All summary items and quantities are entered into PDBS.
10. ☐ **Roadway Plan Sheets** are complete (See (5) – Roadway Plan Sheet Requirements).
    a. ☐ *PSDS Roadway Plan Sheet Requirements* are followed (5).
        i. ☐ "RD Sheet Checklist" items are complete.
        ii. ☐ All callouts follow the "How to Callout Items" checklist.
    b. ☐ All bid items are called out correctly.
    c. ☐ All stationing, northing/easting, curve data are correct.
    d. ☐ All referenced sheet and detail numbers are correct.
    e. ☐ All necessary labels, callouts, identifiers, symbols, and notes are provided and correct.
11. ☐ **Roadway Profile Sheets** are complete (See (5) – Roadway Profile Sheet Requirements).
    a. ☐ *PSDS Roadway Profile Sheet Requirements* are followed (5).
        i. ☐ The "RP Sheet Checklist (Profile)" items are complete (5).
        ii. ☐ The "RP Sheet Checklist (Superelevation)" items are complete (5).
    b. ☐ The profile grid is labeled correctly.
    c. ☐ All necessary labels, callouts, identifiers, symbols, and notes are provided and correct.
12. ☐ **Grading Sheets** are complete.
    a. ☐ Grading sheet developed for all complicated warping areas that cannot be described on typical sections or with superelevation diagrams.
    b. ☐ *PSDS GR Sheet Requirements* are followed (5).

4R1 Continued

i. ☐ The "GR Sheet Checklist" items are complete.

ii. ☐ The Grading Sheet Scale guidelines are followed.

iii. ☐ The "What To Label" Checklist items are complete and correct.

c. ☐ All necessary labels, callouts, identifiers, symbols, and notes are provided and correct.

13. ☐ Project designs are compatible with the roadway design:

a. ☐ Landscaping

b. ☐ Utility

c. ☐ Drainage

d. ☐ Structures

e. ☐ Traffic & Safety

Roadway Project Documents

1. ☐ The **Special Provisions** are complete. (8)

a. ☐ All special provisions conform to the Specification Writers' Guide (verify using Chapter 11 Checklist). (8)

b. ☐ A special provision has been created for each non-standard item.

c. ☐ All general and project specific special provision content is accurate, complete, and does not contain anything unnecessary.

2. ☐ The **Measurement & Payment** is complete. (9)

a. ☐ All M&P items match pay items exactly.

b. ☐ For all non-standard pay items, a complete and correct M&P description of all effort and materials is included.

c. ☐ All units are correct.

3. ☐ The **Acceptance & Documentation** is complete. (10)

a. ☐ All A&D items match pay items exactly.

b. ☐ For all non-standard pay items, a complete and correct A&D is included.

Roadway Cost Estimate

1. ☐ The estimate was verified using the Estimate Review Checklist (found at the end of this document).

4R2 Complete Signing and Striping Plans and Documents

Following *UDOT CADD and Plan Sheet Standards*, finalize the signing and striping plan set and create summary sheets. Finalize the maintenance-of-traffic design and plans. Prepare and assemble the signing, striping, and MOT project documents, including measurement and payment, special provisions, acceptance and documentation, and final cost estimate.

References

1. (MUTCD) Manual on Uniform Traffic Control Devices
2. AASHTO, A Policy on Geometric Design of Highways and Streets
3. Roadway Design Manual of Instruction
4. AASHTO Roadside Design Guide
5. UDOT CADD Standards
6. UDOT Standard and Supplemental Drawings
7. UDOT Standard and Supplemental Specifications
8. UDOT Plan Sheet Development Standards
9. Specification Writer's Guide
10. Measurement and Payment Template
11. Acceptance and Documentation Guide
12. UDOT Project Delivery Network
13. UDOT QC/QA Procedures
14. UDOT Practical Design Guide
15. Estimate Review Checklist

Signing and Striping Plan Sheets

1. ☐ All review comments are addressed and the comment resolutions sent to the Design Leader.
2. ☐ All revisions based on comments are complete.
3. ☐ All signing and striping design revisions conform to design standards (verify using appropriate checklist items from 3R2).

1. ☐ Signing and striping design comply with the UDOT accepted version of the MUTCD.
2. ☐ All details needed to construct the project are developed.
3. ☐ All details conform to *UDOT Standard and Supplemental Drawings* and/or industry approved standards.
4. ☐ **Signing and Striping Plan Sheets** are complete. (See (8) – Striping Sheet Requirements and Signing Sheet Requirements)
    a. ☐ Call-out rules are followed.
    b. ☐ All title blocks are filled out correctly.
    c. ☐ CADD standards are followed and maintained on each sheet.
    d. ☐ All necessary labels, callouts, identifiers, symbols, and notes are provided and correct.
    e. ☐ The "ST Sheet Checklist" items are complete.

4R2 Continued

f. ☐ The "SS Sheet Checklist" items are complete.

g. ☐ All items are called out correctly following the "how to callout items" sections found in both Signing and Striping Sheet Requirements.

i. ☐ Lane widths

ii. ☐ Taper lengths and widths

iii. ☐ Striping types and sizes

iv. ☐ Beginning and end of all striping

h. ☐ The "Checklist for Guide Signs" items are complete.

5. ☐ The **Detail Sheets** are complete. (See (8) – Detail Sheet Requirements)

a. ☐ The *PSDS DT Sheet Checklist* items are complete.

b. ☐ All details are labeled and dimensioned completely and correctly (PSDS).

c. ☐ All title blocks are filled out correctly.

d. ☐ CADD standards are followed and maintained on each sheet.

6. ☐ The **Summary Sheets** are complete. (See (8) – Summary Sheet Requirements)

a. ☐ The *PSDS Summary Sheet Requirements* are followed and complete.

b. ☐ UDOT standard summary sheets are used.

c. ☐ All pay items are included in the summary.

d. ☐ All quantities are correctly calculated.

e. ☐ All pay item names, alignment designations, stations, offsets, units, and quantities are correct.

f. ☐ All summaries are exported from Excel to Microstation and the sheets are updated with the current Excel version.

g. ☐ All summary items and quantities are exported into PDBS.

h. ☐ All title blocks are filled out correctly.

MOT Plan Sheets

1. ☐ All review comments are addressed and the comment resolutions sent to the Design Leader.
2. ☐ All revisions based on comments are complete.
3. ☐ All MOT design revisions conform to design standards (verify using appropriate checklist items from 3R2).
4. ☐ Sign design conforms to the UDOT accepted version of the MUTCD.
5. ☐ VMS signs are included in the MOT design in appropriate locations.
6. ☐ A static information sign is provided for the project duration on major roadways.

4R2 Continued

7. ☐ All project specific signs were developed with approved computer software, correctly sized and dimensioned.
8. ☐ All plan sheets conform to UDOT plan sheet development standards. (8)
    a. ☐ All *PSDS General Plan Sheet Requirements* are followed.
    b. ☐ All title blocks are filled out correctly.
    c. ☐ Plan Sheet CADD standards are followed and maintained on each sheet.
    d. ☐ All necessary labels, callouts, identifiers, symbols, and notes are provided and correct.
    e. ☐ All MOT specific signs and alternate route blazing are identified with the correct sign color, MUTCD code, size, and route shield.
    f. ☐ All VMS signs are identified correctly.

Final Signing, Striping, and MOT Cost Estimate

1. ☐ The cost estimate was verified using the Estimate Review Checklist (found at the end of this document).

Signing, Striping, and MOT Project Documents

4. ☐ The **Special Provisions** are complete. (9)
    a. ☐ All special provisions conform to the Specification Writers' Guide (verify using Chapter 11 Checklist). (9)
    b. ☐ A special provision has been created for each non-standard item.
    c. ☐ All general and project specific special provision content is accurate, complete, and does not contain anything unnecessary.
5. ☐ The **Measurement & Payment** is complete. (10)
    a. ☐ All M&P items match pay items exactly.
    b. ☐ For all non-standard pay items, a complete and correct M&P description of all effort and materials is included.
    c. ☐ All units are correct.
6. ☐ The **Acceptance & Documentation** is complete. (11)
    a. ☐ All A&D items match pay items exactly.
    b. ☐ For all non-standard pay items, a complete and correct A&D is included.

4R3 Complete Signal and Lighting Plans and Documents

Following *UDOT CADD and Plan Sheet Standards* and using templates found on the UDOT Signal and Lighting Design website, complete the signal and lighting plan sheets.

References

1. (MUTCD) Manual on Uniform Traffic Control Devices
2. AASHTO Roadway Lighting Design Guide
3. Roadway Design Manual of Instruction
4. UDOT Signalized Intersection Design Guidelines
5. Signal and Lighting Design Files
6. UDOT CADD Standards
7. UDOT Standard and Supplemental Drawings
8. UDOT Standard and Supplemental Specifications
9. UDOT Plan Sheet Development Standards
10. Specification Writer's Guide
11. Measurement and Payment Template
12. Acceptance and Documentation Guide
13. UDOT Project Delivery Network
14. UDOT QC/QA Procedures
15. UDOT Practical Design Guide
16. Estimate Review Checklist

Signal Plan Sheets

1. ☐ All review comments are addressed and the comment resolutions sent to the Design Leader.
2. ☐ All revisions based on comments are complete.
3. ☐ All signal design revisions conform to design standards (verify using appropriate checklist items from 3R2).
4. ☐ Signal plans conform to the most recent UDOT accepted version of the MUTCD.
5. ☐ All circuit and detection design and details needed to construct the project are developed.
6. ☐ All circuit and detection design and details conform to *UDOT Standard and Supplemental Drawings* and/or industry approved standards.
7. ☐ State furnished materials form is complete.
8. ☐ **Signal Plan Sheets** are complete and conform to UDOT plan sheet development standards. (9)
    a. ☐ All *PSDS General Plan Sheet Requirements* are followed.
    b. ☐ All pole schedules, signal signs, phasing, and signal heads are included.
    c. ☐ All title blocks are filled out correctly.
    d. ☐ CADD standards are followed and maintained on each sheet.
    e. ☐ All necessary labels, callouts, identifiers, symbols, and notes are provided and correct.
9. ☐ The **Signal Schedule Sheet** is complete. (5)

4R3 Continued

a. ☐ Legend contains all symbols from signal plan sheets.

b. ☐ UDOT Excel spreadsheets were used to generate the signal schedule.

c. ☐ Schedule is filled out correctly for all signal items.

d. ☐ All pay items are identified with correct station, offset, quantity, and units.

10. ☐ The **Signal Circuit and Detection Detail Sheets** are complete. (See (9) – Detail Sheet Requirements)

a. ☐ The *PSDS DT Sheet Checklist* items are complete.

b. ☐ All details are labeled and dimensioned completely and correctly (9).

c. ☐ All title blocks are filled out correctly.

d. ☐ CADD standards are followed and maintained on each sheet.

Signal Cost Estimate

1. ☐ The cost estimate was updated and verified using the Estimate Review Checklist (end of this document).

Signal Project Documents

1. ☐ The **Special Provisions** are complete. (10)

a. ☐ All special provisions conform to the Specification Writers' Guide (verify using Chapter 11 Checklist). (10)

b. ☐ A special provision has been created for each non-standard item.

c. ☐ All general and project specific special provision content is accurate, complete, and does not contain anything unnecessary.

2. ☐ The **Measurement & Payment** is complete. (11)

a. ☐ All M&P items match pay items exactly.

b. ☐ For all non-standard pay items, a complete and correct M&P description of all effort and materials is included.

c. ☐ All units are correct.

3. ☐ The **Acceptance & Documentation** is complete. (12)

a. ☐ All A&D items match pay items exactly.

b. ☐ For all non-standard pay items, a complete and correct A&D is included.

Lighting Plan Sheets

1. ☐ All review comments are addressed and the comment resolutions sent to the Design Leader.

2. ☐ All revisions based on comments are complete.

4R3 Continued

3. ☐ All lighting design revisions conform to design standards (verify using appropriate checklist items from 3R2).
4. ☐ The lighting layout is complete.
5. ☐ Circuit schematics are complete.
    a. ☐ All details needed to construct the project are developed.
    b. ☐ All details conform to *UDOT Standard and Supplemental Drawings* and/or industry approved standards.
6. ☐ **Lighting Plan Sheets** are complete and conform to UDOT plan sheet development standards. (9)
    a. ☐ All *PSDS General Plan Sheet Requirements* are followed.
    b. ☐ All title blocks are filled out correctly.
    c. ☐ CADD standards are followed and maintained on each sheet.
    d. ☐ All necessary labels, callouts, identifiers, symbols, and notes are provided and correct.
7. ☐ The **Lighting Schedule Sheet** is complete. (5)
    a. ☐ Legend contains all symbols from signal plan sheets.
    b. ☐ UDOT Excel spreadsheets were used to generate the signal schedule.
    c. ☐ Schedule is filled out correctly for all signal items.
    d. ☐ All pay items are identified with correct station, offset, quantity, and units.
8. ☐ The **Lighting Detail/Circuit Schematic Sheets** are complete. (See (9) – Detail Sheet Requirements)
    a. ☐ The *PDSD DT Sheet Checklist* items are complete.
    b. ☐ All details are labeled and dimensioned completely and correctly (9).
    c. ☐ All title blocks are filled out correctly.

Lighting Cost Estimate

1. ☐ The cost estimate was verified using the Estimate Review Checklist (found at the end of this document).

Lighting Project Documents

1. ☐ The **Special Provisions** are complete. (10)
    a. ☐ All special provisions conform to the Specification Writers' Guide (verify using Chapter 11 Checklist). (10)
    b. ☐ A special provision has been created for each non-standard item.
    c. ☐ All general and project specific special provision content is accurate, complete, and does not contain anything unnecessary.

4R3 Continued

2. ☐ The **Measurement & Payment** is complete. (11)
    a. ☐ All M&P items match pay items exactly.
    b. ☐ For all non-standard pay items, a complete and correct M&P description of all effort and materials is included.
    c. ☐ All units are correct.
3. ☐ The **Acceptance & Documentation** is complete. (12)
    a. ☐ All A&D items match pay items exactly.
    b. ☐ For all non-standard pay items, a complete and correct A&D is included.

Estimate Review Checklist

Provide review checklist of all design cost estimates.

References

1. Estimating – Roadway Design Manual of Instruction (Section 7.19)
2. Estimator's Corner Website
3. UDOT Project Delivery Network
4. Project Development Business System

Estimate (applies to every stage for updating the estimate)

1. ☐ All necessary bid items are included.
2. ☐ All quantities and units are correct.
3. ☐ All standard bid items match UDOT standard bid items exactly.
4. ☐ Unit prices were estimated using UDOT approved methods. (PDBS, local contractors, etc.)
5. ☐ All unit price estimates are documented.
6. ☐ Unit prices reflect the following: (1)
    a. ☐ Location
    b. ☐ Time of year of advertisement
    c. ☐ Complexity of Construction
    d. ☐ Quantity of item
    e. ☐ Limitations of operation
    f. ☐ Current bidding environment
    g. ☐ Availability of materials
    h. ☐ Familiarity of a process
    i. ☐ Specialty equipment
    j. ☐ Risk to contractor
    k. ☐ Inflation
    l. ☐ Construction schedule
7. ☐ Lump sum bid prices are used only when appropriate (i.e. unit pricing is too difficult).
8. ☐ All lump sum bid prices considered the following:
    a. ☐ Contractor risk due to unknown quantity
    b. ☐ Difficulty in making it a unit price pay item

Additional PS&E Estimate

9. ☐ All bid items, quantities, and units match the plan sheet callouts, summary sheets, and M&P exactly.